What is claimed is:

1. An automotive steering device comprising:

an electric motor which generates a steering assist force,

wherein the electric motor comprises a rotation shaft, a stator surrounding the rotation shaft, and first and second rotors rotatable together with the rotation shaft,

wherein the stator includes a plurality of cores arranged circularly about the rotation shaft and elongated parallel to an axis of the rotation shaft, and coils respectively wound around the cores,

wherein an electric current is caused to flow through the coils around the respective cores, whereby the cores are each formed with first and second magnetic poles disposed opposite to each other longitudinally thereof and having opposite polarities,

wherein the first rotor has a third magnetic pole having a polarity opposite to the polarity of the first magnetic pole,

wherein the second rotor has a fourth magnetic pole having a polarity opposite to the polarity of the second magnetic pole,

wherein the third and fourth magnetic poles are respectively brought into opposed relation to the first

and second magnetic poles of the cores in a same phase during rotation of the rotation shaft, whereby magnetic fluxes interlink with the coils around the cores in predetermined directions longitudinally of the cores.

2. An automotive steering device as set forth in claim 1,

wherein the first rotor includes at least one first permanent magnet having the third magnetic pole, and the first permanent magnet further has a fifth magnetic pole having a polarity opposite to the polarity of the third magnetic pole,

wherein the second rotor includes at least one second permanent magnet having the fourth magnetic pole, and the second permanent magnet further has a sixth magnetic pole having a polarity opposite to the polarity of the fourth magnetic pole.

3. An automotive steering device as set forth in claim 1, wherein the third and fourth magnetic poles respectively include magnetic poles to be brought into radially opposed relation to the first and second magnetic poles with respect to the rotation shaft.

4. An automotive steering device as set forth in claim 3,

wherein the third and fifth magnetic poles of the first permanent magnet include a pair of magnetic poles

disposed opposite to each other radially of the rotation shaft,

wherein the fourth and sixth magnetic poles of the second permanent magnet include a pair of magnetic poles disposed opposite to each other radially of the rotation shaft.

5. An automotive steering device as set forth in claim 1,

wherein the third and fourth magnetic poles respectively include magnetic poles to be brought into opposed relation to the first and second magnetic poles longitudinally of the cores.

6. An automotive steering device as set forth in claim 5,

wherein the third and fifth magnetic poles of the first permanent magnet include a pair of magnetic poles disposed opposite to each other in a direction parallel to the axis of the rotation shaft,

wherein the fourth and sixth magnetic poles of the second permanent magnet include a pair of magnetic poles disposed opposite to each other in the direction parallel to the axis of the rotation shaft.

7. An automotive steering device as set forth in claim 1,

wherein a plurality of first permanent magnets are

provided which are disposed circumferentially equidistantly about the rotation shaft,

wherein a plurality of second permanent magnets are provided which are disposed circumferentially equidistantly about the rotation shaft.

8. An automotive steering device as set forth in claim 1, wherein a number of the third magnetic poles and a number of the fourth magnetic poles are equal to each other.

9. An automotive steering device as set froth in claim 8, wherein a number of the cores is greater than the number of the third or fourth magnetic poles.

10. An automotive steering device as set forth in claim 8, wherein a number of the cores is twice the number of the third or fourth magnetic poles.

11. An automotive steering device as set forth in claim 1,

wherein the electric current is supplied to the coils around the respective cores alternately in opposite directions, and the directions of the electric current supplied to each two circumferentially adjacent cores around the rotation shaft are opposite to each other,

whereby attractive forces are generated between the first and second magnetic poles of one of the two adjacent cores and the corresponding third and fourth magnetic poles, and repulsive forces are generated between the first and

second magnetic poles of the other core and the corresponding third and fourth magnetic poles.